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HAY-FEVER, HAY-ASTHMA

ITS CAUSES, DIAGNOSIS, AND
TREATMENT

BY

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P R E F A C E.

THE author does not for a moment delude himself with the idea that this little work will supply a "long-felt want." The chief reason for writing it is to record certain opinions which the author holds upon the causes and effective treatment of hay-fever. These opinions, although not exactly in accordance with those generally current in this country, he is convinced, from a considerable experience, are substantially correct. This little work, which does not pretend to be an exhaustive treatise, of necessity deals with the subject in a more or less sketchy manner. The author nevertheless hopes that it will be found to contribute something of service to those interested.

WILLIAM LLOYD.

15, HARLEY STREET, W.

May, 1907.

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CHAPTER I.

A REVIEW OF THE OPINIONS HELD ON THE EXCITING CAUSES OF HAY-FEVER.

Hay - fever, hay - asthma, was first described by Bostock, in the year 1819. In a paper read before the Royal Medico-Chirurgical Society of London, he gave an account of what he termed "A Case of the Periodical Affection of the Eyes and Chest." This was followed in 1828 by a second paper on this subject before the above-named Society, in which he gave a more lengthened and exact account of the symptoms of the disease, and endeavoured to prove that the symptoms in his case were due to heat. In the latter communication the disorder was designated "*catarrhus æstivus*" or "summer catarrh," showing that Dr. Bostock was quite aware of the circumstance that it commonly came on during the hay season, and must be credited with having first appreciated this connection.

About 1850 the subject excited increased interest amongst the laity and also amongst the members of the medical profession, which showed itself not only in the publication of numerous articles in the Medical Journals, but also in the works of various writers on systematic medicine on the Continent, in America, and

in this country. There were also several treatises published in a separate form between 1865 and 1875, among the principal being those of Abbots Smith, Pirrie and Moore.

In America Morrill Wyman wrote an excellent monograph upon the subject, whilst in England Blackley studied its connection with the pollen of various grasses and flowers, the result of his experiments showing the important rôle they played in the production of the disease. The opinions which have been entertained on the causes of hay-fever have been very varied and in some cases conflicting. The most opposite conditions have, by both writers and patients, been thought capable of producing the disorder, on the one hand, high temperature with dryness of the air, on the other, excess of moisture with high temperature.

By some writers ozone is named as a possible exciting cause of the disease; and by others odours of various kinds, especially those given off by plants. In some cases common dust has been thought to have had a considerable share in bringing on the disorder, whilst in a comparatively large number of instances the agent which has given the popular name to the malady has been taken to be the principal exciting cause. Blackley, and later, Dunbar, made experiments which proved beyond doubt that there is only one exciting cause, namely, the pollen of grass. All observers are, however, agreed on the existence of some peculiarity

of the constitution which predisposes to the disease, but exactly what it is, is not yet decided. It has, however, for all practical purposes, been demonstrated that there is always present a hypersensitive condition of the nasal mucous membrane.

Bostock, who, as we have already said, was the first writer to give a full description of the ailment, believed that in his case it was due to heat, and not caused by the effluvium of grass or hay.

Elliotson, who was a contemporary of Bostock's, agreed with him in believing that the disorder was not caused by hay, but believed it to "depend upon the flower of grass and probably upon the pollen." Elliotson also contended that this view of the case was supported by the circumstances that the disease does not usually appear "till the grass comes into flower ; and as long as there is any flower remaining on the grass the disease continues."

Dr. G. T. Gream, who was also affected with the disorder, believed that the dust from beaten carpets, from the roads, and from other sources, produces the same distressing symptoms. He also remarks that from the end of May to the end of July, at which time hay-fever generally ceases, a quantity of fine dust floats in the atmosphere, finer than any which is in the air at other seasons, increased probably, by the farina of the mass of flowers at that period in bloom, but that during the later and earlier months, the more

frequent rains, and the dews at night, prevent these particles from leaving the ground. He hit upon one very important feature in the phenomena of hay-fever, namely, the influence which rain has in diminishing the intensity of the symptoms.

Kirkman seems to have been the first patient who tested, by an experiment upon himself, one of the supposed causes of hay-fever—the pollen of grass.*

He tells us that a day or two before Christmas he noticed, in his hot-house for flowers, one single plant of the *anthoxanthum odoratum* in blossom, loaded well with pollen. He thought it would be a capital opportunity for trying this particular grass, so he plucked it, rubbed off the pollen with his hand, and sniffed it up his nose ; almost immediately it brought on sneezing, etc., and all the symptoms of hay-fever, which continued for an hour and then left him.

Dr. Abbots Smith† gives numerous cases in which the exciting cause of the attack seems to have been the emanations from grass and other flowering plants. He also states “ that strong light as well as great heat will induce or aggravate the symptoms.”

The work of Dr. Morrill Wyman‡ deals with the hereditary character of the disease. The disease is said to commence in America at two different periods—in

* Quoted from Dr. Phœbus' *Typische Fruhsommer-Katarrh*, p. 137.

† *On Hay-fever, Hay-asthma*, by William Abbots Smith, M.D., 4th edition, London, 1866.

‡ *Autumnal Catarrh (Hay-fever)*, by Murrill Wyman, M.D.

the month of June, as rose cold, hay cold, or June cold, and in the month of August as autumnal catarrh. The symptoms are essentially the same in their character at these different periods.

Like other writers on hay-fever he makes individual predisposition the starting point. Dr. Wyman holds that American autumnal catarrh is not in any case produced by hay or by grass in flower, inasmuch as the hay is generally made one or two months before the catarrh comes on.

In speaking of the causes of the paroxysms of the catarrh, he mentions the following : the dust and smoke of a railway train ; the dust of the highways ; strong light and sunshine ; the odour of flowers, especially that of a full-blown rose ; the smelling at, or the eating of fruits of various kinds.

With some patients Indian corn (maize), when in flower, produces sneezing and other signs of hay-fever, but the plant that brings on the most decided symptoms of the disease is the Roman wormwood. This plant commences to flower about the middle of August, or a little later, and continues to flower till late in September.

“An approach to it,” Dr. Wyman says, “will, during the critical period, produce a paroxysm with a very large number of persons. It grows very sparingly in mountainous regions, and is there generally short and feeble.”

Dr. Beard* seemed to think it quite correct to place hay-fever among the neuroses. In treating of this part of the subject, he says " Hay-fever is essentially a neurosis—that is, a functional disease of the nervous system. . . . The debilitating influence of heat and the external irritation of a large number of vegetable and other substances, are exciting causes merely, widely varying in their effects with different individuals, and of themselves are powerless to induce, or at least to sustain, an attack. . . . As the disease is not due to any single specific cause, animal or vegetable, as has been supposed, no specific will ever be found for it." He names twenty-five agents as the exciting causes of the malady. In the United States the more prominent exciting causes appear to be Roman wormwood and the pollen of corn, both of which flower about the middle of August, and both of which, without doubt, excite the paroxysms in some persons, even when applied in the non-catarrhal regions of the mountains. Other irritants "as cinders, dust, smoke, bright sunlight, gaslight, etc., are common to the whole summer season ; but they are not sufficiently powerful to induce protracted attacks of the disease, unless stronger vegetable irritants start the malady and co-operate with them in maintaining it."

Blackley's† experiments have proved that the

* *Hay-fever, or Summer Catarrh*, by Dr. Beard.

† *Hay-fever*, by C. Harrison Blackley, M.D.

exciting cause of hay-fever is the presence of the pollen of flowering grasses and cereals in the atmosphere during the time the disorder prevails, and, moreover, that the mildness or severity of the malady correspond with the varying amount of pollen in the air.

He made experiments with the following presumed causes of hay-fever: viz., benzoic acid, coumarin (odoriferous principle found in some of the grasses, etc.); odours of various kinds; dust, pollen, the influence of light and heat. I shall only deal with the experiments that were made with dust, pollen and heat.

Dust as a Factor of Hay-fever.

In speaking of dust as a cause of hay-fever most authors have used the term "common dust." As Blackley points out, the dust of any district will show that, in addition to those matters which may with propriety have the name "common" applied to them, it contains ingredients to which this cannot be applied, and the nature of which will to a large extent depend upon the season, upon the geological character of the district and upon the nature of its botanical productions. The number as well as the kind of germs and other organic bodies found in the dust of any district will also largely depend upon its meteorological conditions which prevail in that district.

I have myself noticed that dust could at certain

times of the year produce some of the milder and less marked symptoms of hay-fever, but there was this peculiarity about these attacks, that generally they came on only during the time that hay-fever prevailed or immediately after the hay season was over, but rarely, if ever, during winter or early spring.

There was also another peculiarity which these attacks had, namely, that they were more fitful, coming and going in a more irregular and transitory manner than the ordinary attacks of the disease ever do when they have once set in. Also that the attacks were more frequent whenever one had to pass through any dusty lane in the country, when the hay had been recently all gathered in. As a matter of fact it is practically certain that dust *per se* will not induce true hay-fever even in susceptible patients. In these, it is true that dust from roads will apparently bring on an attack, but we can easily demonstrate by microscopical examination that during the summer the upper layer of dust from any road contains a large proportion of pollen. It is however more than probable that the irritating action of the pollen is intensified by the presence of the sharp siliceous spicules of which dust upon country roads is composed.

Experiments with Pollen.

As far as I am aware Blackley was the first to put this agent to the test by means of a systematic and

continuous course of experiments. The first investigations were made with the pollen of grasses, but the pollen of plants belonging to thirty-five other natural orders were also tried. These experiments were made at all times and seasons of the year. In some cases the dried pollen was used after it had been kept some months, but as a general rule fresh pollen was used, collected during the period in which the plants indigenous to this country were in flower.

The effect of pollen was tried in five different ways, viz., 1st, by applying it to the mucous membrane of the nares; 2nd, by inhaling it, and thus bringing it into contact with the mucous membrane of the larynx, trachea, and bronchial tubes; 3rd, by applying a decoction of the pollen to the conjunctiva; 4th, by applying the fresh pollen to the tongue, lips, and fauces; and 5th, by inoculating the upper and lower limbs with the fresh moistened pollen. The pollen of a number of the grasses was first tried, and it is stated that in almost every instance it gave distinct and unmistakable evidence of its power to disturb the healthy action of the respiratory mucous membrane. When a small portion of pollen, just sufficient to tinge the tip of the finger yellow, was applied to the mucous membrane of the nares, some of the symptoms of hay-fever were invariably developed, the severity and continuance of which varied directly with the quantity and the number of times it was used.

The action of the pollen of the order graminaceæ was, on the whole, very distinct and well marked. In some cases it was comparatively mild, and in other cases somewhat severe. In the case of plants of some of the other natural orders the action was quite as well marked as in any of the grasses.

Blackley applied a quantity of pollen from two anthers of the *lolium italicum* to the anterior surface of one forearm after the skin had been abraded. In a few minutes after the pollen had been applied the abraded spot began to itch intensely, and the parts immediately around began to swell, this effect seeming to be entirely due to effusion into the subcutaneous cellular tissue. There was no heat or redness; although the swelling had the appearance of œdema, it located itself at first exactly around the abrasion to which the pollen had been applied, and gradually spread from this point and formed a flattened tumour, which had its centre at the abraded spot. There was no tenderness and the swelling was easily made to pit on pressure. The swelling increased in size until it measured two and a half inches in length by one inch and a half in breadth, and was raised above the ordinary level of the surface nearly three-quarters of an inch. Experiments of a similar character were performed by applying pollen to the integument covering the tibia—results were the same.

Dr. Wyman, in speaking of his experiments, says: “Early in September, 1870, I gathered in my grounds

at Cambridge, Mass, some Roman wormwood in full flower, covered with pollen, taking the whole plant, stalk and roots. This was carried to the White Mountain Glen, about 1,200 feet above tide, where we remained till September 23rd in the afternoon. The parcel containing it was then opened and freely sniffed by myself and my son. We were both seized with sneezing and itching of the nose, eyes and throat, with limpid discharge. My nostrils were stuffed and my uvula swollen, without cough, but with the other usual symptoms of autumnal catarrh. These troubles continued through the night and did not disappear till the afternoon following. A portion of the same plant," Dr. Wyman says, "was sent to friends. The results of the experiments tried were as follows: Eight persons sniffed the plant. One was seized with asthma, and did not entirely recover from the effects until the next day; one was attacked with catarrh as he would have been at the same period at home, and the eyes were irritated for several hours; one had sneezing and coughing for some little time; two had sneezing only; one had sneezing and watering of the eyes; one had only irritation of the eyes for some time; and one experienced no effects whatever. Eight other persons were in the house at the time who are subjects of the disease, but did not sniff the plant, and were not similarly affected."

Temperature exercises an important influence

upon the production as well as upon the activity of pollen. A high temperature is in itself favourable to the generation of pollen, but a high temperature with severe drought, will, in the case of the grasses, check their growth, and thus prevent the formation of pollen. Under such circumstances, hay-fever patients may have a short season of attack, but the symptoms may be very severe whilst they last.

Low temperature operates in quite another manner with the majority of the grasses. Some of the cereals, however, will arrive at maturity and maintain a vigorous and healthy condition during their period of growth with a much drier state of the atmosphere and soil than is borne by many of the grasses. Thus it happens that in cold and wet summers hay-fever patients will suffer much less than in better seasons; whilst in a very hot summer with continued drought, patients may almost escape the disease even if they reside in a part of the country where hay grass is largely cultivated. But when the cereals come to be in flower they may suffer very severely for a time.

The pollen grains of different orders of plants vary from about 0.01 to 0.001 of an inch in diameter. They also vary in shape and in the roughness or smoothness of their outer coat. In the state in which the pollen comes to be when in contact with the mucous membrane of the nares, the outer coat will in some cases be perfectly smooth and even, such as, for instance, in the cereals

or the grasses. In others the surface is studded over with sharp points, and whatever may be the varying conditions such pollen is placed under, with regard to excess or deficiency of moisture, this roughness is never entirely got rid of. Between these two extreme characters of surface there are all degrees. In commencing the enquiry into the question as to what constituent of pollen is the exciting cause of hay-fever, we encounter some difficulties which are not easily removed. Pollen is, in its recent state, a living structure, and any mode of manipulation which alters the relation of its separate parts, may change its character and lessen its vitality. It will no longer be the active and living organism it was before our examination began.* Examined under the microscope the pollen consists of microscopic cells, which possess two coats, known as the extine and intine. In rare cases the outer coat appears to consist of two or even three layers.

The *intine* is the innermost layer, and appears to be of the same nature and appearance in all pollen-grains. It is usually smooth, very delicate and transparent, and is composed of pure cellulose.

The *extine* is a hard thick resisting layer, and is liable to great variation ; thus it is sometimes smooth, at others marked with granular processes or spiny protuberances. The nature of these markings is always the same for the pollen of any particular species or variety of plant, but

* *Manual of Botany.* J. Reynolds Green, F.R.S.

varies much in that of different plants. The extine is often covered by a viscid or oily secretion. The colour of pollen-grains also resides in the extine. In by far the majority of cases the pollen-grains are yellow, but various other colours are also occasionally found.

Besides the various markings just described as existing on the extine, we find also either pores or slits which vary in number and arrangement in different plants. Thus we commonly find one pore in monocotyledons, as in the grasses; and three in dicotyledons.

Pollen-grains are found of various shapes, the most common forms appear to be the spherical and oval; in other cases they are polyhedral or triangular, etc. It should also be noticed that the form of the pollen is materially influenced according as it is dry or moist, the size of the grains being liable to vary according as they are examined in a dry state or in water.

THE CELL CONTENTS.*—Besides the protoplasm or living material present in the cell, very many other substances are found which are extremely variable in nature and amount. The bodies included in the cell contents—using the term in this restricted sense—may be divided into two groups: Those soluble and those insoluble in the cell-sap. In the former are included constructive materials for the protoplasm, such as freshly absorbed inorganic salts, and more highly elaborated bodies destined either for immediate use, or temporary

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storage, or possibly merely on their way through the cell. Various carbo-hydrates, chiefly sugars, vegetable acids and their salts, nitrogen containing bodies in the form of amides, belong to this category. Other substances, possibly nutritive, possibly only the bye-products of nutrition, such as tannin, various glucosides, alkaloids, and other complex bodies are also to be met with.

The bodies which form the second or insoluble group include starch grains, fats, proteid reserve materials, either in amorphous, granular, or crystalline form, and crystals of inorganic salts.

We have in plants a large number of secretions (peculiar bodies which the protoplasm forms or secretes) which are known as enzymes or unorganised ferments. The action of these bodies is not at all completely understood, but they evidently carry out many changes in the substances deposited in the cells. Many of these exist in the cell-sap in a state of solution ; others, however, in a solid form.

When water is allowed to come into contact with the dried pollen, this quickly swells and assumes its normal shape. If moisture continues to be supplied it loses its form, and, whatever may have been its shape previously, it tends to become more or less spherical. Carried still further, the granular contents of the cells are seen to protrude more or less through the pores, and to form, in this way, minute mastoid processes, in some cases bulging very considerably beyond the outer coat.

The granular contents will, in the case of the pollen of the grasses, move to the end to which the single pore, in this pollen, is situated, leaving one-third or one-half of the cell comparatively empty. After a short time, varying according to the condition of the pollen when placed in contact with water, the portion of the granular contents of the cell is expelled, and diffuses itself gradually in the surrounding fluid. If, instead of bringing the pollen grain into direct contact with water, we allow the vapour of water to act upon it, the changes described above occur much more slowly. We reproduce the condition in which pollen is placed when it is brought into contact with the respiratory mucous membrane by being inhaled. In the one case, we have mucous and watery vapour acting upon the pollen, whilst in the other we have only watery vapour present.

Blackley came to the conclusion, from the results of his experiments, that the disturbance caused by pollen is due partly to its mechanical and partly to its physiological action.

The mechanical changes which I have briefly described Blackley considers quite sufficient to account for some of the earlier symptoms of hay-fever, sneezing and discharge of serum, and that the swelling caused by the effusion of fluid into the submucous cellular tissue is due to the presence of some substance or quality in the granular matter, the exact nature of which is at

present unknown. He considers that it is highly probable that the finer particles of this matter do, in some cases, pass through the mucous membrane of the respiratory passages, and by getting into the circulation in this way, give rise to the constitutional symptoms we see developed in some cases.

There is another supposed cause of a form of hay-asthma, namely, the odour given off by certain animals. The presence of cats, rabbits, or guinea-pigs, will, in some cases, cause a form of asthma which cannot be distinguished from hay-asthma. In the case of the two species last-named, it is well-known that they are often kept almost constantly amongst hay, and it may, therefore, with very great propriety be suggested that the fur of these animals may be simply the carrier of the granular matter and of the pollen.

Blackley also made experiments upon the 'quantity of pollen found floating in the atmosphere during the prevalence of hay-fever, and in its relation to the intensity of the symptoms.'

From observations he found that fully 95 per cent. of all the pollens that were collected in this country belonged to the graminaceæ. Pollen may be carried from flower to flower by wind or water, or by the agency of insects or other animals. From this point of view plants have been classed as anemophilous, or wind pollinated, that is, fertilised by the agency of the wind, hydrophilous or

water-pollinated, entomophilous or insect-pollinated, and zoophilous or those pollinated by other animals. Of these methods of pollination the anemophilous and the entomophilous are the most wide spread ; in the former case certain structural features are associated with the mode of transference of the pollen. It is produced in such flowers in great abundance, is extremely light and dry, and in some cases furnished with bladders to aid its transport. The receptive organ is sometimes a bulky cone, the leaves of which are separated from each other and from the common axis by spaces into which the pollen may drop ; sometimes it is a much divided or plumose stigma, often furnished with hairs, so that pollen falling on it may be readily retained.

On the other hand, anemophilous flowers are always inconspicuous and of a comparatively humble type. Flowers which are pollinated by insects are usually much larger and more showy, and are often very highly coloured and provided with characteristic odours. Their perianths and sometimes their sporophylls are highly modified to adapt them to the habits of their insect visitors. As a further attraction to the latter they usually produce honey in some part of the flower, in such a situation as will lead to the removal of pollen by the insect in its search for the attractive liquid. The pollen itself also is often the subject of the insect's visit. The grasses are examples of anemo-

philous plants, and the orchids of entomophilous plants. The pollen of the latter is seldom found floating in the atmosphere, and cannot, therefore, be a cause of hay-fever. The grains of the former are almost always found floating in the atmosphere singly. In no case did Blackley in his experiments find a number of grass pollen-grains massed together on the exposed slides. He therefore contends that pollen will be distributed in the same manner on the mucous membranes. From his experimental enquiry he claims to have shown that pollen of all kinds will give rise to some of the symptoms of hay-fever; and that the progress and fluctuations in the severity of the malady during the hay-fever period, correspond with the varying amount of pollen which floats in the atmosphere at the time. Moreover, that all the other so-called causes have little or nothing to do with generating the disease. Also, that pollen rises to high altitudes and is carried very long distances by atmospheric currents; at times it will descend to the lower part of the atmosphere and be deposited on board any ship that comes in its way. In this manner some of those anomalous cases of hay-fever, which are said to have occurred out at sea, may be reasonably accounted for.

In November, 1902, Professor Dunbar published a pamphlet on the "Cause and Treatment of Hay-Fever."

In this he has shown conclusively by experiments that there is but one cause for hay-fever—the pollen of

grasses and certain plants. The pollen of about 130 different plants were examined by him, of which that of 25 grasses and of only 7 other kinds of plants were found to exert a definite action. The pollen of rye was the most active.

He succeeded in isolating from the pollen of certain grasses a peculiar toxic substance of an albuminous nature which was very powerful, and when applied in very small quantities to the conjunctiva or nostrils of people predisposed to hay-fever, within a few minutes produced in a more or less marked degree the local symptoms characteristic of that disease, whilst the same quantity of the toxin when applied to the eyes and nostrils of persons not predisposed remained without any effect.

Dunbar obtained from the pollen three different products: (1) the toxic substance, (2) a starchy matter, (3) the ethereal oils. Only the first-named—which he isolated in the form of a white powder—produced the typical symptoms. He also confirmed by his experiments the conclusions arrived at by Blackley and others, that the severity of hay-fever is in direct proportion to the quantity of pollen present in the atmosphere.

Observations on the Influence of Light and Heat.

Both light and heat have been thought by some authors, and also by some patients, to give rise to exacerbations of the disorder, when once it has been

established. Blackley refused to accept the statements, as no evidence had been brought forward to show that the actual exciting cause of the disease had not been present when these exacerbations have come on apparently through exposure to light.

Dr. Abbots Smith agrees with Phœbus and Bostock in believing that great heat and strong light will induce or aggravate the symptoms of hay-fever. One case, however, is given in which the attack came on whilst the patient was engaged in unfurling the sails of a yacht a short distance out at sea. Blackley considers it highly probable that the sails had become the receptacles for pollen, which had been blown on to them from the land, and that the unfurling of the sails had disturbed the pollen and caused it to be inhaled during the period of exertion. He turns to the evidence furnished by medical men and by patients in India, that whilst sufferers have mostly escaped attacks on the plains, they have often had them when they have ascended into the cooler atmosphere of the hills ; and, when patients have been attacked in both situations, the general testimony is that they have suffered less severely in the former than in the latter place.

Then, again, it has not been proved that the period at which we have the greatest average intensity of light is the period at which hay-fever prevails.

The powerful influence which heat has in deranging the whole economy of the body has been recognised

from very early times, but, in searching the works of writers on medicine, we look in vain for any description of symptoms resembling those of hay-fever.

Bostock was, as we have seen, the first to ascribe the malady to the influence of heat. He believed that the cooler air of the sea coast was the cause of the comparative immunity he enjoyed during hot summers.

CHAPTER II.

PREDISPOSING CAUSES.

General. Beyond the circumstance that the predisposition to hay-fever is more common amongst the educated, the brain-workers, and town-dwellers than it is amongst the working-class, we have scarcely anything to guide us in forming an opinion as to the class or kind of individuals most likely to be affected by the malady. I myself have never seen a case of true hay-fever among the working part of the population. It is certainly true that I have met with cases suffering from similar symptoms among the working classes, but upon examination hypertrophic rhinitis with catarrh was invariably discovered, and these patients, when questioned, tell you that they are liable to similar symptoms during any period of the year and not only during the hay-fever season. The disease seems to affect persons of all temperaments and all kinds of constitutions, but the nervous temperament is credited as predisposing to attacks of hay-fever.

Many instances have been quoted to show the neurotic element. For example, the case of J. N. Mackenzie. An attack came on in a susceptible person by offering her an artificial rose to smell. Another case has been quoted where the patient had

an attack of sneezing, with other symptoms of hay-fever, whilst looking at a beautiful picture of a hay-field. Another patient in thinking of the disease, and seeing his swollen face in the glass, had all the symptoms. I myself have never seen a patient with such extreme susceptibility of the nervous system as is here described, and can, therefore, only give these cases on the authority of the writers.

Age undoubtedly exercises some influence upon the commencement of the attacks, and the sexes appear to be about equally affected. Dr. Wyman* gives a table showing the age of 72 patients at the time the disorder first commenced.

Of these :—

11 had their first attack when under 10 years of age.

15	„	„	20	„
25	„	„	30	„
8	„	„	40	„
11	„	„	50	„
2	„	„	60	„

Dr. Beard† also gives a table containing a total of 188 patients. Of these :—

34 had their first attack when under 30 years of age.

56	„	„	40	„
65	„	„	50	„
33	„	„	60	„

* *Autumnal Catarrh*, by Dr. Wyman, p. 81.

† *Hay Fever*, by Dr. Beard, p. 45.

In May of last year I treated a little girl, 6½ years, suffering from the typical symptoms of hay-fever. On examination of the child I found adenoids; I advised immediate removal, after which, the symptoms disappeared and did not recur throughout the season.

Hay-fever is strongly hereditary in its character. Dr. Wyman states, six members of his own family were sufferers from the malady. In another family, consisting of six individuals, five had either autumnal catarrh or June cold. Sajous has been able to show that, in 35 per cent. of his cases, near relatives were similarly affected, and in 42 per cent. the patients had asthmatic relations. Dr. Beard states, one-third of the patients had relatives who suffered from some form of the malady. No information that can be relied on has yet been obtained as to the effect which severe illnesses have upon hay-fever.

Local. Hay-fever is classed among the nasal reflex neuroses for the reason that its principal manifestations are the result of a temporary arrest of vaso-motor control over the vessels of the nasal mucous membrane. Hack, in 1882, directed general attention to the subject of nasal reflexes, making it include such affections as neuralgia, headache, etc., and initiated a discussion which has to this day continued and remains unsettled.

The frequent association of asthma with intra-nasal disease was recognised by Trousseau long before it

was realised that asthma might be caused by pathological irritation in the nose or that it might be benefited or cured by treating the existing diseased condition.

It is only since Voltolini's classical case of asthma, which he cured by the removal of a nasal polypus, that serious attention has been directed to intra-nasal abnormalities suggesting a causative relationship.

The observations of Fränkel, Daly, Roe, Harrison, Allen, J. N. Mackenzie, Francis and many others, have demonstrated the association of asthmatic attacks with intra-nasal disease. Daly pointed out that in a large proportion of the cases of hay-asthma, there was local disease of the mucous membrane, the cure of which rendered the patient insusceptible to conditions previously exciting the attacks. Bosworth stated that asthma was invariably caused by some form or other of nasal obstruction. This relationship has not only been abundantly confirmed but is now generally recognised by all rhinologists.

In hay-fever there is always present a hypersensitive condition of the nasal mucosa. The affection must be differentiated from nervous coryza and paroxysmal sneezing excited reflexly by the action of bright sunlight (sensorimotor) or by the imagination (ideomotor), as, for instance, the occurrence of sneezing and other symptoms of hay-fever induced by the sight of an artificial rose or the harmless house cat.

François-Franck performed an interesting series of experiments on animals with a view of demonstrating the occurrence of various nasal reflexes. It was shown by these experiments that irritation of the inflamed nasal mucous membrane produced various phenomena in the respiratory and circulatory systems, such as laryngeal and bronchial spasm, spasmodic movements of the respiratory muscles, slowing of the heart's action, and distension of the blood-vessels of the head on one or both sides.

One part of the effect produced by pollen is due to its direct action, and another to its indirect or reflex action. The discharge of serum in the nares is an example of the first kind. In the congestion of the vessels of the conjunctiva we may have both kinds of action. The reflex mode of action may be exhibited by any irritant applied to the mucous membrane of the nostrils. Every aurist knows that the introduction of the catheter to the eustachian tube will give rise to a flow of tears and to congestion of the conjunctival vessels. Another way in which reflex action may manifest itself is when the irritation in the nostril is transferred to the bronchial tubes and produces asthmatic symptoms. Most writers on hay-fever have attributed the dyspnoea which occurs in the asthmatic form of the disorder to spasm of the circular muscles of the bronchial tubes. Weber and many others believe it to be due simply to tumefaction of the bronchial

mucous membrane. It is possible that hay-asthma is a spasmodic contraction of the bronchial muscles. This theory corresponds best with the sudden onset and disappearance of the asthmatic seizure. It explains the instant relief afforded by anti-spasmodic remedies, such as atropine, morphia, chloroform and lobelia. The application of cocaine to the nasal mucous membrane will often immediately relieve an asthmatic spasm; this, to my mind, definitely shows that hay-asthma is a nasal reflex.

In the preceding paragraphs I have endeavoured to lay before my readers a *résumé* of the opinions by various authors of the causes of this troublesome disease, and to keep my individual opinion in the background. For my own part, as the result of a careful study of a very large number of cases of hay-fever, I feel convinced that we have conclusive evidence that in this country there is but one primary exciting cause of the malady as it occurs in summer, and that is the pollen of the grasses; and that where pollen of any kind is thrown into the atmosphere in large quantities, it will give rise to hay-fever in those predisposed to it.

I am quite aware that other agents may be found to produce symptoms not unlike those of hay-fever, but these should be classed as secondary causes. The main predisposing cause is a hypersensitive condition or susceptibility of the nasal mucous

membrane. There are three factors in the etiology of an attack of hay-fever, viz.: First, the presence of hypersensitive areas in the nasal mucous membranes; if accompanied by asthma similar areas are detected in the pharynx. Second, a diseased, or at least an irritable condition of certain nerve centres, giving rise to symptoms in the nose itself or in more or less distant parts by reflex action. Third, the presence of pollen. The absence of any one of these factors is sufficient to prevent an attack.

In order to understand the physiological associations existing between the various portions of the respiratory tract, it is necessary to glance at the nerve supply of the nose.

The nerves of the nasal fossæ are of two kinds—those of special and those of common sensation. The filaments of the olfactory nerve enter the nose through the foramina in the cribriform plate.

The nerves of ordinary sensation supplying the nose come chiefly from the first and second divisions of the fifth nerve and form the sphenopalatine or nasal ganglion. Of the branches derived from the ophthalmic divisions of the fifth nerve the largest and most important is the *nasal*; and the fact that it supplies the anterior part of nasal septum, the outer wall, and the floor of the nose will explain the more or less profuse lachrymation occurring during operations upon or irritation of these parts. It is the several

branches of the superior maxillary nerve and those coming from the sphenopalatine ganglion, however, that supply by far the greater portion of the nasal chambers.

The arterial supply to the mucous membrane and to the erectile tissue of the turbinated bodies is controlled by vasomotor nerves from Meckel's ganglion, and is under control of the vasomotor centres in the medulla, where there is probably a connection with the nuclei of the vagus through association fibres, a physiological connection which has an important bearing on the pathology of various neuroses, as for instance the cases of asthma associated with nasal disease.

The subjects of hay-fever form two distinct clinical types—the predisposing pathological cause present in the nose varying sufficiently to justify this classification.

(A) On examination of the nose no structural abnormality is discovered, but certain areas of the mucous membrane are hypersensitive.

(B) Some pathological condition or abnormality is present, plus hypersensitive areas. In some patients, especially the subjects of asthma, identical areas are present in the posterior wall of the pharynx. They may be situated opposite the oral cavity, above and behind the soft palate, but most commonly opposite the larynx.

Amongst the intra-nasal diseases present may be mentioned (1) simple chronic catarrhal or hypertrophic

rhinitis, (2) polypi, (3) sinus disease, (4) ethmoiditis, (5) adenoids, (6) deflected septum, spines and crests, (7) foreign bodies, or rhinoliths.

Group (A) form the *true* type of hay-fever, and the symptoms are only produced by pollen.

Group (B) should be termed *pseudo* hay-fever; the symptoms are much the same, may come on during any period of the year, and the primary or secondary are equally as exciting.

In the *true* type of hay-fever, it is at present impossible to explain the presence of sensitive areas. Why one or two members of a family should be so susceptible to the action of pollen, while the others remain free, is one of the problems to be solved.

In the *pseudo* form, the nerve-endings may be rendered sensitive in various ways. First, there must be more or less hyperæmia, and this, of course, involves a proportionate amount of hyperæsthesia. Second, by friction or pressure, a polypus, and especially one which can change its place, may rub against the nasal mucous membrane, or induce pressure by the transitory swelling which so frequently occurs, and in this way displace the epithelium, leaving the nerve endings exposed. Third, synechiæ resulting from the accidental use of the electro-cautery may exert tension in the sensory nerve endings. Fourth, it is probable that the contact of a spur with the turbinated bodies has a decided influence in setting up reflex symptoms.

They may promote a tendency to catarrh, and thus render the nerve endings more sensitive. On the other hand, hypertrophy or congestion of the nasal mucous membrane may be the consequence and not the cause of hay-fever.

Examination of the True Type of Hay-fever.

The appearance of the nasal-mucous membrane will vary with the period of the year at which the nose is examined :—

Before or sometimes after the periodic fever is over, the mucous membrane usually appears normal, but to one who has had experience in this class of cases, the presence of hypersensitive areas are readily distinguishable by their heightened colour and slight elevation above the surrounding mucous membrane.

In most of my patients there was nothing wrong pathologically; a small spur, or slight deviation of the septum might have been present, but from the fact that it gave rise to no trouble requiring treatment, I should consider these noses as normal.

During the critical period the turbinates are considerably swollen. The mucous membrane presents an extremely red, congested appearance, and as a whole is sensitive to the touch of a probe, but certain areas can be discovered by careful search, which show peculiarly hypersensitive reflexes. The extreme sensitiveness is due probably to the fact that the mucous

membrane is practically denuded of its epithelium, and also may itself become swollen and inflamed.

Where is the site of origin for reflex disturbances ?

In the pseudo form of hay-fever, no particular nasal area can be described in connection with the disease. In fact, almost every part of the mucous membrane has been stated to be hypersensitive.

Hack considered that reflex disturbances originated in the anterior and posterior end of the inferior and middle turbinate.

Heryng states that most reflex phenomena are set up in the posterior part of the septum.

Francis and Torstenson claim that in most cases they have demonstrated an area in the upper and posterior region of the septum, above the centre of the middle turbinate, which is closely related to asthma.

Lewy is said to have discovered a number of thick nerve branches on the under surface of enlarged inferior turbinates.

In my experience there is always more than one hypersensitive area present in various parts of the nose.

The mucous membrane, as a whole, is sensitive to the touch of a probe, but certain areas can be discovered by careful search, which shows peculiarly hypersensitive reflexes, such as cough or sneezing.

Careful examination of my cases leads me to locate these areas in the upper and anterior half of the nasal

cavity. For instance, the middle meatus, the region of the ethmoidal cells, the anterior half of the septum, and especially where the septum meets the nasal cartilages. The hypersensitive area may be only one small spot or several, and may even be a fusion of several areas to comprise one relatively large one.

The methods of detecting the hypersensitive areas :

I need hardly mention that this procedure should be carried out before the hay-fever season commences. The whole interior of the nose should be thoroughly examined, and the slightly "elevated areas" looked for and tested.

Most authors advise that the various parts of the mucous membrane should be touched with the end of a nasal probe, and if it produces irritation, a tendency to sneeze, burning, and lachrymation, such a spot should be cauterized. This method of detection will suffice in some cases, but not in all.

The method I have employed is the following :— A small piece of cotton wool is twisted round the end of a probe and is dipped into a weak solution of nitrate of silver, or a weak solution of iodine. My idea is to imitate the chemical action of the granular matter of the pollen, and the touch will be the mechanical cause. If in this way certain areas, when irritated, bring on an attack of hay-fever, then our diagnosis is confirmed and this area should be thoroughly destroyed.

This is a valuable experiment, proving that hay-fever is a reflex disturbance. It is invariably successful in producing asthma, which, however, can immediately be cut short by applying 20 per cent. of cocaine to the nose.

CHAPTER III.

SYMPTOMS.

First attacks of hay-fever are often milder and less persistent than they are after a patient has suffered for some years ; this is no doubt due to the fact that the susceptibility to the action of pollen is not so marked on its first appearance as it is at a subsequent time. There is also, in some cases, a tendency for the disorder to take on the asthmatic form in later years.

This, to my mind, is due to chronic swelling or hypertrophy of the nasal mucous membrane, as a consequence of the repeated attacks, which causes the susceptibility to become more marked in each succeeding year.

The symptoms, have been divided into six groups, viz., into the head group, the nose group, the throat and mouth group, the chest group, and the general symptoms. For all practical purposes the simple division into the catarrhal and the asthmatic forms of the disorder will answer quite as well as the classification given above. A patient may suffer from one or from all the phases of the disorder, but whatever difference there may be in the symptoms, the malady is one and the same, and due to the same cause.

In most cases, and especially in the early years, the larynx, trachea and bronchial tubes are unaffected.

The first symptom of the presence of pollen is generally itching of the parts,—the nostrils, fauces and eustachian tubes ; then in a severer form in the eyes ; and, lastly, in the bronchial tubes, in those who are liable to the asthmatic form of the malady. When the dose of pollen increases, the attack passes from the mild form to the true catarrhal stage. This is characterised by the discharge of thin watery serum from the nostrils, by violent attacks of sneezing, and in many cases by swelling of the eyelids and severe lachrymation. Generally the violent attacks of sneezing precede the discharge from the nostrils, but the coryza in a mild form may be the first symptom of an attack.

In the earliest stage of the disorder the fits of sneezing are neither very long nor very severe, but when the malady has become fully developed they become so violent and seem to take such entire possession of the patient, when they do come on, that, for the time being, he loses all control of himself. In some cases the patient will sneeze twenty or thirty and even approaching a hundred times in succession, and whatever he may be occupied with when the fit comes on he is obliged to set it aside and resign himself to the paroxysm until it is over. Occasionally the patient will break out into a cold sweat at the termination of an attack of sneezing. After the attack has lasted for

a short time, the sub-mucous tissue in the nasal passages begins to swell, and this goes on increasing until finally no air whatever can be drawn through the nostrils.

This "stiffness" of the nose often varies in a very curious manner. After both passages have been equally closed for a time, if the patient gets into a recumbent position, so as to lie on one side, the nasal passage which is uppermost becomes after a short time quite open, whilst the lower one becomes still more completely occluded. This change is caused by the fluid in the submucous tissue gravitating towards the lowest part, and as often as the position is changed this alteration in the condition of the two passages will take place. During the hay season, most patients have paroxysms of sneezing, not only in the day, but frequently also during the night, and especially when the disorder is just arriving at its highest point of intensity.

So long as the supply of pollen is kept up, the sneezing and discharge of serum continue. If the quantity is large, however, the swelling of the sub-mucous tissue continues, and the *alæ nasi*, as well as the mucous membrane of the nose, become tender and inflamed, and have a tendency to bleed if rubbed. Under these circumstances the patient is only able to breathe through the mouth, and on awaking in the morning the tongue and mouth are more or less parched.

As the disease progresses, the nasal discharge becomes more inspissated and puriform.

In the eyes, as in other regions, the first symptoms of a commencing attack is itching. At first it is very mild, but as the hay season progresses it becomes very troublesome, and is frequently attended by a slight burning sensation, which extends to the deeper parts of the eye-ball.

When the disease is fully developed the lachrymal canals and nasal ducts become almost entirely closed by the swelling of the submucous tissue. A short time after pollen first comes in contact with the eye the conjunctival vessels become injected, and generally the larger capillaries show the first. After a time the itching and burning become so troublesome that the patient finds it difficult to resist the temptation to be constantly rubbing the eyes, and in the end adds much to the irritation. Occasionally shooting neuralgic pains are felt in the back part of the orbit and in the eyeball. In severe attacks the eyelids become œdema-
tous, and in some patients a considerable amount of photophobia, and the patient is glad to seek the shade rather than the broad sunlight. The discharge which comes from the eye is at first thin and watery, after a time, however, it becomes more inspissated. Taking the eye symptoms as a whole, they disappear rather sooner than the nasal symptoms. With some patients who are extremely sensitive to the action of pollen the

skin of the face and neck will occasionally show signs of irritation. There is no doubt that all the subjects of hay-fever are liable to have the normal condition of the skin disturbed, but it is only under some circumstances that this disturbance is severe enough to attract notice.

In the summer, 1903, I, myself, on several occasions after a cycle ride in the country, suffered from intolerable itching of the skin of the face and body.

The mucous membranes of the fauces and buccal cavity do not seem to be as sensitive to the action of pollen as the eyes. Nevertheless, some degree of congestion of the mucous membrane and swelling of submucous tissue does occur. The symptoms caused by the action of pollen upon the lining membrane of the pharynx are itching and slight burning or pricking. Occasionally there is a little hoarseness. The itching is generally felt to be very severe in the hard palate, in the upper part of the pharynx, and in the eustachian tubes. Sometimes there is slight dulness of hearing, owing to the extension of congestion in the eustachian tubes. The throat symptoms, like those of the buccal cavity—to which, indeed, they really belong—vary much in intensity in different individuals; they may, in a few cases, be somewhat severe, but generally they will be very mild.

The asthmatic symptoms of hay-fever are by far the most important of any of the groups, because

they are the most troublesome and the most dangerous. They vary in intensity in different individuals and in different seasons. In some cases there is only a very slight sense of obstruction in the breathing ; in others the derangement may cause great suffering, and at times may seem to endanger life. The symptoms are thought to be due either to the obstruction caused by the altered condition of the submucous cellular tissue of the trachea and bronchial tubes, or more probably to spasm of the bronchial muscles.

In many of its symptoms hay-asthma closely resembles ordinary asthma. In both there is the same sense of tightness across the chest at the commencement, and as the disease advances there is the same loud wheezing with slow inspiration and expiration. There is also at first a dry cough, that is to say, a cough with scanty expectoration, in both forms of the disorder, and as the breathing becomes more and more difficult the face may be pale and anxious looking. If the dyspnœa still increases, the face will become livid and turgid, the patient will seem to be threatened with suffocation, and will try to fix himself in such a position that the respiratory muscles can act with the greatest vigour. This will invariably be in the upright position, with the arms and hands firmly fixed on some article of furniture. In both cases too the voiding of a thin frothy sputum may be one of the first signs of approaching relief, but not so frequently in hay-asthma as it

is in ordinary asthma. There are, however, some points in which the two disorders differ, and these it is important for us to notice.

In ordinary asthma the attack usually comes on in the night, and is often preceded by a long-continued fit of dyspepsia.

In hay-asthma the first attack of the season generally comes on in the daytime after the patient has been exposed to the influence of pollen and is usually quite independent of dyspepsia. In hay-asthma the first attack of the season may, and often does, come on in the open air, but in ordinary asthma it generally comes on in the house. Another very important point of distinction is that unless the patient is brought accidentally into contact with pollen, hay-asthma only comes on during the hay-season, whilst ordinary asthma may come on at any time of the year, and is most common in winter.

In ordinary asthma there are paroxysms with intervals of perfect freedom, at least in the early and less confirmed state. In hay-asthma this scarcely ever occurs in so marked a degree as in ordinary asthma; there may be remissions and sometimes even distinct intermissions for short periods, but the tendency is for the disease to continue with more or less severity during the whole of the hay-season. And, lastly, if coryza does accompany an attack of common asthma it is rarely as severe as it is in hay-asthma, and we

scarcely ever see the conjunctivæ affected as they are in the latter disorder.

In the early stage of the disorder the difficulty of breathing is not very great, and if the patient lives in the centre of a large town he will often escape with comparatively little suffering. In cases where the patient is extremely susceptible to the action of pollen, he may have the symptoms pretty fully developed even in a large town, but this is not often the case.

Coming to the head group of symptoms, these are a fulness of the head, with heaviness and pains behind the ears and a feeling as of a band passing round the head above the eyes. There are occasionally shooting pains in the head, and in some cases a considerable amount of tinnitus aurium, due to the congestion and inflammation of the lining membrane of the eustachian tube and middle ear. The tinnitus may remain for some weeks, or even months, if untreated.

The constitutional symptoms of hay-fever are differently stated by different authors. In some cases they are almost entirely wanting. Amongst these are low spirits, a dislike to mental and physical exertion, and palpitation of the heart on making violent exertion. In some cases there are pains of a neuralgic or rheumatic character in various parts of the body.

After the disease has lasted some three or four weeks—varying in time according to the kind of season and the susceptibility of the patient—it begins to

decline. If the season is a very favourable one for hay-making, that is to say, if the weather is fine and hot, it will decline rapidly, and *vice versa*.

When any of the cereals happen to be in bloom at the time hay-making is about finishing in any district, patients residing there, will find their attacks to be prolonged. And if it should happen that a second crop of grass comes into flower before the harvest is over the attack may seem almost continuous from May to September. When once the stage of convalescence has set in, if the patient keeps free from the influence of pollen, the recovery is very rapid. This may, however, appear to set in two or three times in the course of a season. If there is a fall of rain for three or four days in succession, and especially if this is tolerably continuous, the symptoms subside so quickly that the patient may think recovery has commenced. Generally, however, convalescence is slow, for the reason that in most seasons the quantity of pollen diminishes comparatively slowly. Exercise influences the severity of the attacks considerably, for if it be taken when the disorder has become fully established, the irritation in the hard palate, nostrils, and fauces will become very marked. The fits of sneezing also will become more violent and prolonged, and if the patient suffers from the asthmatic form of the complaint the breathing will become very laboured.

When we remember that the quantity of air inhaled in violent exercise, is three or four times the amount we take in in a state of rest, it is easy to see that exercise must make a wide difference in the severity of the symptoms. One of my cases, an officer in the volunteers, suffering from a mild attack of hay-fever whilst in the camp grounds, gradually got worse when marching out with the regiment, until at last the symptoms became so severe that he was compelled to fall out and return to camp.

Almost all authors are agreed upon the fact that hay-fever leaves no perceptible effects behind. The eye recovers its healthy condition almost as quickly as it became affected, and never, as far as I am aware, exhibits any trace of organic change in any of its structures as regards the lungs. Even in those cases where the asthmatic attacks have been very severe, and have occurred periodically for years, emphysema, which is so apt to complicate the course of long continued attacks of ordinary asthma, is rarely seen to follow.

CHAPTER IV.

TREATMENT OF HAY-FEVER.

We come now to discuss what will be considered by sufferers from hay-fever, the most interesting and important part of the subject, namely, the treatment and prevention of the malady. No doubt the most desirable mode of dealing with a patient who suffers from hay-fever is to rid him of the susceptibility altogether, and the means to accomplish this I shall describe under CURATIVE measures. When these are for any reason contra-indicated, we must content ourselves with measures giving temporary relief. These may be said to divide themselves naturally into the prophylactic and the palliative.

Prophylactic.—When one reads the literature of hay-fever, even up to a comparatively recent date, one is struck by the many different modes of treatment advised.

Amongst these, baths of various kinds occupied a prominent place. The daily use of the cold plunge or cold shower-bath, is recommended, also the hot-air and the vapour baths. Some authors have advised the Turkish bath during the hay-fever period. As regards results, in no case do baths of any kind

seem to have any beneficial effect upon the attacks of hay-fever in the early part of the season ; nor do they in any way lessen the susceptibility that exists in the nasal mucous membrane to the action of pollen. On the other hand, many of my patients have said that the Turkish bath is serviceable in lessening the prostration which most hay-fever patients complain of at one part of the season or another.

A large number of drugs have been tried in doses, varying from the purely infinitesimal to the toleration point. Amongst these may be mentioned : arsenic, aconite, ammonium carbonate, belladonna, camphor, mercury (in various forms), ipecacuanha, nux vomica, iodide of potassium, bichromate of potassium, chlorate of potassium, quinine, senega, stramonium, sulphur, strychnine, etc.

This list by no means makes up a full record of the drugs tested, but it will serve to show that a fair number of remedies have been tried. In some cases they seemed to do good, but often a relapse came on whilst the drug was still in use, and in some instances when a full dose was taken, especially with quinine, the unpleasant effects were worse to bear than the disease itself. None of the drugs possessed any perceptible control over the severity of the symptoms. On the whole then, the treatment by medicines has been very unsatisfactory.

In the hands of some practitioners, who are but

imperfectly acquainted with the cause and natural history of hay-fever, remedies have been credited with effects which were due simply to the diminution of the quantity of pollen in the atmosphere during the latter half of the critical season.

Experiments have been made with numerous drugs with a view of delaying the commencement of the attacks. If one remedy failed, the use of another was immediately commenced. In using the drug, the plan adopted by various physicians was to commence using it some two or three weeks before the hay season began, and to discontinue its use if it had no beneficial effect. The drugs tried were: arsenic, arsenite of quinine, iodide of arsenic, bromide of potassium, iodide of potassium, quinine, salicine, and sulphur.

Quinine proved an entire failure. It was used by injecting a saturated solution of the drug into the nostrils several times a day, as well as by the mouth. *Salicylic acid* and *soda salicylate* were also found to be failures. *Potassium bromide* has been said to have some influence in delaying the attacks, but it is very feeble. *Potassium iodide* possessed some control at the commencement, but in attempting to push its use beyond a moderate dose, the disturbance produced by the drug is as bad to bear as a mild degree of hay-fever. *Arsenic* and *sulphur* may also be said to have no prophylactic action. *Iodide of arsenic* is credited with useful properties in the early stage of the disease.

Of all the methods of prevention, the removal of the patient to some place beyond the reach of pollen is the most effective ; and the open ocean is the most free from the presence of this agent. Where a patient can spare the time, a sea voyage during the early summer months is an unfailing remedy in ninety-nine cases out of a hundred. Failing this a residence at the seaside is the next best thing, if the place is well selected. A place situated on the extreme point of a peninsula will in some instances be almost as efficacious as a voyage. Where the land is used principally for grazing (as in some parts of the Western Highlands), the liability to the disease will be correspondingly diminished. In America the patients obtain great relief, if not complete immunity for the time being, by having a sojourn in the mountainous districts during the critical season. Patients who live in the centre of a large town, may almost entirely escape the most troublesome symptoms of hay-fever by removing indoors during a few of the most critical days. For those patients who live in the outskirts of a town, or in the country, the following additional precautions will be necessary in order to escape any considerable amount of suffering. In the first place, a patient must make up his mind to remain in one room during fourteen or eighteen days of the worst part of the season, and this room must be protected from the ingress of pollen in the following ways :—

Outside the room door a curtain of thin calico should be hung, so as to cover the door completely ; ingress and egress to and from the room being had by turning the curtain aside. When in use the curtain should be kept sprinkled with water which has had 10 grains of carbolic acid dissolved in each pint. In addition to this, it is well to have a frame of thin wood made to fit the upper or the lower part of the window of the room. This, when covered with two folds of black muslin, acts as a ventilator and percolator, and keeps out the pollen whilst it lets in the air. Wherever the patient is, it is of the highest importance that he should not, whilst the grasses or cereals are in flower, have a constant current of air passing through his room without some means of intercepting the pollen. Pollen in a still atmosphere indoors will fall to the floor, but if the air is constantly renewed the supply of pollen is kept up, and a certain amount of it must be inhaled by those who come in contact with it.

Another important point is the avoidance of sudden changes of temperature. This is very apt to occur if the patient allows himself to get into a profuse perspiration, and then remain still in the open air or where there is a draught. In such circumstances the already irritated mucous membranes of the air passages are very apt to take on some degree of inflammatory action, and in this way to render the patient an easier prey to the floating pollen. For a similar reason, a

patient should, as much as possible avoid the inhalation of dust or irritating vapours. The action of pollen really is to clear away a portion of the natural protector of the mucous membrane—the epithelium—thus exposing the sensory nerve-endings, and so rendering the nasal mucous membrane exceedingly sensitive to the contact of foreign bodies. Under such circumstances the inhalation of matters that are at other times quite innocent, will often give rise to violent attacks of sneezing and to difficulty of breathing. The occurrence of such attacks has led some writers, and also some patients, to believe that these secondary causes of paroxysms are the primary causes of the disease in many cases. They are, however, easily distinguished by the fact that they have no disturbing influence at other seasons.

Another important precaution, if the patient has to go out of doors, is to protect the eyes by close-fitting coloured goggles. To the nostrils, a piece of fine surgical sponge should be fitted. It serves to filter the inspired air, and may be worn without discomfort by day and, if necessary, during the night.

Palliative.

Nothing more than a palliative treatment should be undertaken while the attack lasts.

This cannot be satisfactorily carried out so long as the nostrils are blocked with the swollen and cedematous inferior turbinates.

These engorged bodies must, therefore, be first reduced by spraying a 5 per cent. solution of cocaine upon the anterior ends of the turbinates, and when these bodies have contracted the same solution may be applied by means of a piece of cotton wool into both nostrils. In a few minutes the nasal mucous membrane will have become less sensitive, and a warm alkaline solution, consisting of boracic acid grains v, sodium bicarbonate grains v, and sodium chloride grains iii, aqua ad. ℥i, should, by means of a nasal syringe, thoroughly wash the nasal cavities, and thus free them from all secretion. The mucous membrane is dried in the gentlest way with absorbent cotton. Adrenalin extract, in 1 to 5,000 strength may be sprayed, but I prefer to smear the nasal mucous membrane over with the solution by means of a small tuft of wool on a forceps. In a few minutes a considerable amount of shrinkage of the inferior turbinates will have occurred, and the patient experiences the pleasure of free nasal breathing. Once again is the warm alkaline solution used, the nose is dried with pledgets of cotton wool, and then one, two or more of the offending turbinates are lightly touched in two or three spots with chromic acid. Dr. Grayson,* who employs this method of local treatment says: "This may seem a rather startling therapeutic measure, but there are several reasons for its employment. In the first place, although it is seemingly

* *Diseases of the Nose, Ear, and Throat*, by C. P. Grayson, M.D., Philadelphia, 1907.

an additional irritant to the already incensed membrane, yet it is to be remembered that the condition present is not one of simple coryza, but is wholly the result of suspended vasomotor inhibition, brought about through the specific influence exerted by some variety of pollen. It is not an ordinary irritation; its effects being dependent upon an idiosyncrasy afforded by the patient. The condition then is one of complete vascular relaxation, and the action of chromic acid at this juncture is that of a tonic stimulant rather than an irritant. Within a few hours a material contraction of the distended turbinate will have occurred, the secretion will be less profuse, and the paroxysms of sneezing will be neither as frequent nor violent. This pin-point application of chromic acid occasions no destruction of tissue, and it may be repeated, therefore, at intervals of a few days without hesitation and with increasing benefit to the patient. It is not unlikely that its stimulating and indeed tonic effect may be central as well as peripheral."

A great variety of local remedies have been from time to time recommended for the relief of hay-fever. Snuffs, lotions used in the form of a spray, and, what is more pernicious, the prescription of proprietary compounds. It seems only necessary to advertise these proprietary articles sufficiently long enough in order to popularise their employment. They mostly consist of cocaine, adrenalin, or its equivalent under other names.

Since these particular drugs possess such useful qualities for surgical purposes, it is necessary to say a word of caution against its indiscriminate use. The fact that it possesses the property of blanching mucous membranes has seduced people into prescribing it for use by the patient in inflammatory cases, especially acute and chronic rhinitis. A moment's thought will show us that this very inflammation which so annoys the patient is nothing more or less than the reaction of the tissues to bacterial invasion, and is, in fact, the very means whereby that invasion is repelled.

The effect of cocaine, in whichever way it is applied to the nasal mucous membrane, is only transitory, and as the drug gradually loses its effect, stronger and stronger solutions are required. The danger to cocaine poisoning is very great, and besides the risk of the patient, especially in nervous individuals, acquiring the cocaine habit for its stimulating effects. Moreover, such frequent use of the drugs lead to a greater tendency to vascular dilation, and increased irritability of the nasal mucous membrane. The internal administration of atropine, belladonna and morphia has the same objections. These remedies may undoubtedly give relief to all the symptoms, but it must be evident that they lend themselves to grave objections to allow patients to use such dangerous remedies. Menthol, which has a somewhat similar action to cocaine, without its dangers, can be readily recommended. A 10 to 20 per cent. solution in liquid paraffin, or olive oil, may

be applied by means of a camel hair brush or sprayed into the nose.

Carbolic acid in fluid vaseline (grs. v ad. $\frac{3}{4}$) may also be used. Its application causes a little smarting, but soon passes off.

A method of relieving the irritation in the eyes and face, is to bathe these first in tepid, then in cold water several times a day, taking care to include in the process those parts of the hair that are exposed to the atmosphere. The hair forms a very efficient gathering ground for pollen, and there is no doubt that when this is disturbed it will give rise to irritation if it comes in contact with the eyeball.

The use of one of the various forms of collyrium will be found to be beneficial in allaying the irritation of the eyes. They are to be bathed with it three or four times a day.

The *asthmatic form* of hay-fever is a much more distressing phase of the malady than the catarrhal form, it is not more amenable to treatment by drugs than the latter. Nevertheless something may be done to lessen the force of the attacks by the aid of drugs. The administration of 10 grains of iodide of potassium with five drops of liquor sodii arsenalis three times a day, will sometimes give speedy relief.

In that form of hay-fever in which asthma is the leading symptom from the commencement of the attack, the early administration of *sulphur* is stated to

be very valuable. It is most useful where the patient is troubled with occasional attacks of urticaria at other times of the year, and when the sneezing in his hay-fever attacks is apt to be most troublesome on first awakening in the morning, or on first lying down in the evening. All the other asthmatic palliatives, such as medicated cigarettes, Himrod's powder, nitre fumes, etc., will be found of good service in hay-asthma.

Stramonium is also useful when given internally in the later stages of the disease.

For the prostration which is present in many cases of hay-fever, and especially in the middle and later periods of the disease, the arsenite of quinine or phosphate of quinine will be found most useful.

Curative.

In treating true cases of hay-fever and asthma, our success must depend, in the first place, on the correctness of our diagnosis—that is to say, the recognition of the presence and exact location of sensitive areas or other pathological conditions ; and, in the second place, in the judgment, patience and thoroughness with which we carry out the local treatment that we adopt.

The treatment may be required under the following conditions, viz. :—

- A. Where some definite pathological condition or deformity is present.
- B. Where no disease or abnormality exists in the nose.

Where some Disease or Deformity is present.

In these cases, most surgeons would advise treatment independent of the existence of hay-fever or asthma.

Adenoids, if present, should be removed. Nasal polypi should be treated with the snare; but better results are obtained by freely curetting the diseased bone and mucous membrane in the ethmoidal region. Some writers have declared that many cases, especially of asthma, have been made worse after the removal of polypi. The only explanation I can suggest is that the hyperæsthetic areas present have been overlooked, and consequently left untreated. Marked erectile swellings are to be reduced by means of the galvano-cautery, etc. Anterior or posterior hypertrophy of inferior turbinates should either be removed with the snare or scissors. A polypoid, or œdematous enlargement of the middle turbinate, should be removed with a spokeshave or snared with the aid of Grunwald's forceps. Deflections, spurs or ridges, especially those which impinge on the structures of the outer wall of the nasal passage, and so cause obstruction, should be treated in the usual manner.

Where no Disease is present on inspection.

This class of patient has been said to be the most difficult to treat. Personally, it has not been my experience. After making up our minds, as to the

exact location of the sensory areas, the cautery should be applied.

If for any reason—and occasionally the nervous state of the patient will not permit of a scientific examination—we are unable to ascertain the exact position of the sensitive areas, then the various nasal reflex areas which have been pointed out by authors as causes of hay-fever, must be cauterized, one by one, at several sittings, until improvement is effected.

As I have previously mentioned, the position of areas in the true form of the disease is more or less constant, but in the “pseudo” form and especially in asthma, it is possible that any part of the nasal mucous membrane may be the pathological reflex spot.

Hack cauterizes the inferior turbinate. Francis, MacDonald and other rhinologists advise the application of the cautery to the septum in every case. Others have secured the best results by cauterizing, or the removal of the tubercle of the septum.

Francis, in describing his method, advises that a line be drawn from a spot opposite the middle turbinate body, forwards and slightly downwards for a distance of half an inch. In a few days' time this is repeated on the other side of the septum, and he subsequently cauterizes alternate sides at intervals of a week or two according to the results. At each sitting he selects a fresh area, and sometimes the posterior portion of the septum is also cauterized.

My own procedure in a case of hay-asthma is briefly as follows :—Firstly, the anterior ends of the inferior turbinate are cauterized ; after an interval of a fortnight the tubercle of the septum or the septal mucous membrane situated opposite the anterior extremity of the middle turbinate is dealt with in a similar way, and lastly, in some cases the posterior end of the inferior turbinate and the posterior and upper part of the septum are treated by means of application of astringent lotions. I certainly do not advise the electro-cautery to be applied to the posterior nares, as such a manipulation is in the nature of a step in the dark. Hyperæsthetic areas in the pharynx, if present, must also be cauterized.

Technique for the Application of the Electro-Cautery.

The chief difficulty experienced by the student or practitioner who is desirous of using the electro-cautery in the treatment of affections of the nasal passages is the absence of minute and detailed instruction. In the text-books, these are conspicuous by their absence, and in default of an efficient instructor the operator runs the serious risk of acquiring a faulty technique which subsequent experience will only confirm.

I shall here endeavour to supply in a measure this deficiency, and to inculcate certain main first principles

essential to the proper use of the instrument. With these well assimilated, the student can proceed to learn by experience the refinements of cautery technique with satisfaction to himself and safety to his patient.

Any galvano-cautery battery that is capable of heating the platinum point or cautery-knife to a cherry-red heat will answer.

The instrument should be kept at a dull cherry-red when operating on hypertrophied turbinates. The cautery knife is placed upon the thickest part of the hypertrophy, and by means of gentle to-and-fro movements is made to cut through to the bone, when it is carefully withdrawn, so as not to detach the eschar which it has formed. The operator should be careful to cut down to the periosteum before withdrawing his cautery knife. The edge of the cautery knife and not its flat surface, should be applied to the hypertrophy, because the object is not to destroy the nasal mucous membrane, but to produce a firm and permanent eschar that shall anchor the mucous membrane to the bone beneath, and prevent the turbinated tissues from swelling with each "cold" to an extent sufficient to occlude the nasal chambers. The less mucous membrane destroyed the better.

A white heat is to be used for the destruction of "hypersensitive areas," the galvano-cautery knife being so introduced that its flat surface will rest upon the sensitive areas and make a superficial burn.

In cautery work it is always advisable to operate upon one side of the nose at a time and allow an interval of a week or two to elapse before attacking the other.

Before applying the local anæsthetic to the part, it should be properly cleansed with a mild alkaline solution ; it should be dried before the local anæsthetic is used and afterwards dried again.

To apply the anæsthetic a thin piece of cotton wool is saturated with the solution used, wrung nearly dry and nicely adjusted to the part to be operated on. The length of time to produce anæsthesia varies, averaging, ten to fifteen minutes for a 10 or 20 per cent. solution of cocaine or cocaine and adrenalin solution. Cocaine spray should be avoided as the spray is usually very coarse and consequently there is danger of cocaine poisoning.

Although as a rule the shrinking of the tissues caused by the drug facilitates the operation, sometimes insensibility to pain is all that is required. Too much shrinking may be an actual hindrance to operation on the inferior turbinates, as one may be at a loss to know how far to go.

Many surgeons are in the habit of treating the nose repeatedly with the cautery, instead of making a thorough destruction of the hypertrophic tissues at a single application. This I believe, as a rule, to be injudicious, not because the cautery is an uncertain

instrument, but from the fact that the tissue upon which it is used is uncertain. I have the notes of two cases of my own where the electro-cautery was frequently used and produced a condition resembling ozæna. The cautery is not to be recommended upon the septum in tuberculous and syphilitic subjects, both diseases having a predilection for that part when in a weakened condition from the excessive irritation set up. It should rarely be applied to the middle turbinate. The mucous membrane in this region is intimately blended with the periosteum: periostitis and osteitis are very liable to follow its use and to aggravate the disease for which it was applied. Owing to the proximity of the structure to the intracranial contents, and in view of the free venous and lymphatic communication between them, the use of the galvano-cautery is prohibited.

The cautery electrode should either be applied to the part at a dull cherry-red or applied cold and then kept at a dull cherry-red—not a white heat. After as much tissue as desired has been destroyed, the platinum point should be quickly removed before the heat is turned off.

If this precaution is not taken, it will stick, and requires to be pulled away, in doing which the tissue will be torn, and later accompanied with pain and bleeding.

To try to reduce enlarged posterior ends of the inferior turbinates by an anterior introduction of

an electrode is in the nature of a step in the dark. The platinum point must always be kept in sight, otherwise the liability arises of damaging the eustachian orifices. I frequently observe that after the dense anterior end of the inferior turbinate has been reduced, the soft hypertrophied posterior end will atrophy and allow free breathing through the nasal passage. The exact method in which the cautery produces its effect when applied is difficult to explain, but nevertheless the shrinking in some conditions is out of all proportion to the actual burning. It is very striking in cases of simple erectile swelling of the inferior turbinate.

The subsequent care of a surface when the nose has been cauterized is important. As a rule, the tissue may be allowed to take care of itself as far as possible.

After the operation, a good deal of reactionary swelling follows, with profuse discharge of mucus, the patient feeling as if he had caught cold in that nostril ; but this quickly subsides if the necessary precautions are taken.

In very vascular cases, also, considerable hæmorrhage may be induced if the tissue is torn.

It is very desirable that the patient, during the periods of sloughing, should adopt every care in sanitation and avoid exposure to septic influences.

The superficial sloughs produced by the cautery tend to fall off in a period varying from a few days to a fortnight. As well for surgical reasons as for

the patient's comfort, accumulated discharge should be cleared away by carefully syringing or douching the nose with a mild antiseptic or alkaline lotion.

When a crust has nearly separated, great care must be taken in removing it with the forceps lest the cauterized tissue be damaged. The use of peroxide of hydrogen (vols. xx) is very serviceable to detach the crusts. A very excellent method, which has been described is the following :—The flat surface of the cold electrode is firmly laid against the crust, a dull red heat is turned on and shut off at once. The crust is thus made adherent to the electrode, and will come away with it ; there is thus rarely any damage done.

Especial care must be taken when a cauterized surface is in close proximity to another part. If the septum nasi opposite the turbinal be burnt too, a synechial band will certainly form, which is a most troublesome condition and difficult to get rid of. The two surfaces, therefore, should be mechanically separated.

For this I use a piece of sterilized unmedicated gauze, dipped in a mild antiseptic oily preparation, which is replaced daily after the nasal cavities have been cleansed in the usual manner. On no consideration should this precaution be omitted until the healing is complete, otherwise adhesions readily form across the ulcerating surfaces.

In severe cases one author has advised the complete

removal of the inferior turbinates, of the middle turbinates, or even of both.

In defence of such a colossal procedure he claims that "these operations in hay fever are apparently never followed by the dryness of the nose and throat which follows them when performed in other affections."

The author qualifies his statement and tells us "he has performed the operation on several patients, but, of course, as a last resort and only when the application of the cautery had been tried and entirely failed."

In order to understand the illogical and unscientific character of the operation, we will consider briefly the physiological functions of the middle and inferior turbinated bodies.

The nose is a perspiratory organ, and if the function of perspiration is interfered with, various deleterious results are certain to be brought about. Its most important function is to warm, moisten, and free from dust the inspired air. The venous plexuses of the mucous membrane lined with ciliated epithelium are peculiarly adapted to the carrying out of this function. The more watery portion of the secretion which is largely elaborated by the glands of the mucous membranes, saturates the inspired air with moisture, whilst the moist condition of the mucous membrane itself serves to catch and retain micro-organisms and particles of dust which might otherwise

enter. The large vascular sinuses which form a peculiar feature of the nasal mucous membrane, together with the bulk of the secreting glands are collected in the inferior turbinate. These structures play the chief part in cleansing, warming and moistening the inspired air. When dust or any other irritating particles gain entrance into the nose, the vascular sinuses dilate, the secretion of the glands is increased, and abundant fluid is poured out to wash the irritant away.

What happens, then, when the turbinates are removed?

The nose will become merely a hollow cavern divided into two by the bony septum, the orifices of the eustachian tube, the upper surface of the soft palate, and the posterior wall of the pharynx being plainly visible.

There will thus be a great tendency to a dry condition of the pharynx, larynx, and trachea, and a liability to catarrh of these regions, and probably also pulmonary diseases.

As a matter of fact, the upper air passages will suffer less from respiration through the healthy mouth than from breathing through a nose when the inferior turbinates have been removed.

We are all aware, too, of the important part the ciliated epithelium plays to the well-being of the nose and, in consequence, to the general health. Their removal does away with these important functions, the

air containing its organic matter is admitted unfiltered and in consequence the mucous membrane of the pharynx, larynx, and trachea will eventually become dry, catarrhal, and later on even pulmonary disease may supervene. I need hardly point out to my readers that hay-fever usually lasts but a few weeks in the year, whereas the condition of atrophy and catarrh of the mucous membrane is an affection of *every* week in the year for the remainder of life.

Caustics.

When the galvano-cautery is not at hand, chemical caustics, such as chromic acid, trichlor-acetic acid, nitrate of silver, or nitric acid, may be employed. Solutions of the two former caustics may be applied with small pledgets of wool on a probe; nitric acid must be used with small wooden sticks, as the end of a wooden match.

Chromic acid is more frequently employed than any of the others in the treatment of hypertrophied mucous membrane. It should be used in the following manner:—The end of a silver or aluminium probe is heated and plunged into a bottle containing crystals of chromic acid, some of which will stick to the probe and be withdrawn with it from the bottle. A further application of heat will fuse these crystals, which are now ready for use. The probe may also be prepared for use as a cautery by wrapping a few fibres of cotton

about its end and rubbing into it moist powdered crystals of chromic acid until the cotton is saturated with the paste. A little cocaine may be first applied, but the applications are not painful as a rule. The part is thoroughly dried, and then the end of the probe covered with chromic acid is pressed firmly into the hypertrophy, and pushed backward and forward over the line to be cauterized, and finally withdrawn. After the lapse of a few moments the nasal cavity is thoroughly mopped out with pledgets of cotton wool soaked in a solution of bicarbonate of soda, care being taken that none of the resulting chromic acid reaches the pharynx and is swallowed.

Chromic acid is more uncertain in its action than the cautery. It is difficult to limit the depth to which the cauterization will extend ; and it is apt to spread over its surface and produce a somewhat superficial destruction of the mucous membrane by no means desirable. For this reason the cautery is always preferable except when it is necessary to destroy sensitive areas in the neighbourhood of the ethmoidal cells where the electro-cautery is contra-indicated.

The Application of Astringent Lotions.

There are certain regions of the nose, *e.g.*, ethmoid, middle meatus, the superior and posterior part of the septum, and the point where the septum meets the nasal cartilages, to which the application of the cautery

is impossible, owing to the close anatomical relation of the parts, and any attempt to introduce it would injure neighbouring surfaces.

As a substitute, the frequent application of astringent lotions have been very successful in my hands, speaking roughly, these having for their object the hardening of the mucous membrane, in the sense of making it less irritable.

The late Sir Andrew Clarke advised spraying the mucous membrane with a mixture of glycerine of carbolic acid, small quantities of quinine (3i ad. ʒi) and perchloride of mercury (pt. 1 in 1,000). Protargol has been advocated by Alexander. Others have had good results from using biniodide of mercury (strength 1 in 50 to 1 in 20). When the nose is extremely sensitive, only a small amount of cotton wool should be wrapped round the end of a nasal probe, so as to form a brush capable of absorbing but a small amount of the solution, which should be carefully applied to those portions of the nasal mucous membrane which seem hypersensitive.

A 5 per cent. solution of cocaine may be used beforehand, but it is not usually necessary.

The mucous membrane of the nose becomes immediately congested and swollen, accompanied with sneezing, lachrymation and all the symptoms of hay-fever, and these symptoms are followed by a nasal catarrh lasting from one to three days.

The application should be repeated on the opposite

side at an interval of a week. In many cases, if this is efficiently done, the patient will remain perfectly free from the malady throughout the season.

POLLANTIN.—Owing to the great publicity given to Dunbar's theory that hay-fever is to be regarded as a toxic affection, and as such, should be treated with the corresponding serum antitoxin, Sir Felix Semon* undertook to investigate upon a large amount of clinical material, Professor Dunbar's researches by experimenting with the toxin and antitoxin provided for the occasion by Dr. Prausnitz (Dunbar's assistant). Sir Felix Semon† published a second paper entitled "Impressions of the Efficiency of Professor Dunbar's Antitoxin in Hay-Fever." In this paper Semon states the results of his experiments and I shall quote here his own words: "With regard to the cutting short of fully-established attacks, I cannot say that I have observed any marked effects, with the exception that so far as the irritation of the eyes is concerned all my eight patients immediately after the application of the remedy experienced a sense of relief, the duration of which was very variable.

"To sum up: I can unfortunately not say that the remedy (pollantin) has in any sense acted as a panacea in any of my cases. It has given relief in some, and appears to have acted beneficially certainly in post-

* *Brit. Med. Journ.*, 1903, i, p. 73.

† *Ibidem*, 1903, ii, p. 123.

poning the occurrence of the attack in others of my patients. Possibly these effects might have been even more marked had the applications been made with even greater frequency. I ought also to say here that according to the spontaneous statements of at least a few of my patients it appears to have had the effect of making the present hay-fever period altogether a good deal more tolerable than on previous occasions. The main applicability of the serum would certainly seem to lie in the direction of its postponing for several hours the occurrence of the regular attack. If further experiences should show that prolonged and frequent application neither diminishes its efficiency nor causes unpleasant by-effects, even the limited results above described will not have inconsiderably added to our therapeutic power of combating this troublesome affection ; but whether this will be so I do not dare to say at present. I am quite willing to modify my impressions with further and more extensive experience. The statements, made in this paper, however, represent the impressions I have so far gained."

Wolff-Eisner* also undertook to test upon a large amount of patients both pollantin and a similar serum called graminol. Objectively speaking, the results of these experiments tend to show that these serums are altogether devoid of any reliable therapeutic activity,

**Hay-Fever, its Nature and Treatment*, by Alfred Wolff-Eisner, Munich, 1906.

and that even when employed prophylactically they are quite powerless in preventing the onset of an attack of hay-fever. In 47 per cent. of the cases pollantin was without any action whatsoever, and in 50 per cent. some alleviation was observed. Only in one single mild case could a really favourable result be observed, although the symptoms persisted for four weeks in spite of pollantin treatment.

CHAPTER V.

ILLUSTRATIVE CASES.

In the present chapter I have selected a few cases from my note book, which, I think, illustrate certain points in the symptomatology, and show the effects which may be expected to follow well directed treatment.

Case 1.—A lady residing at Maidenhead consulted me in May, 1905. In giving particulars of her case, she says the attacks generally commenced some time in May, and from the commencement of the disease her life is a perfect misery until the end of summer.

Bright sunshine and dust of any kind will bring on an attack of hay-fever.

Immediately on leaving her bed in the morning she sneezes some thirty times, accompanied with profuse discharge from the nose and eyes. During the hay-fever season the patient is unable to take exercise or even drive in her trap during the day time owing to violent paroxysms of sneezing, lachrymation and intense itching of the eyelids. She suffers from considerable mental depression, headache, loss of appetite and decreases in bodily weight to the extent

of a couple of stone. Pollantin has no effect in allaying the symptoms.

Examination : The nasal mucous membrane extremely sensitive, and the inferior turbinates in contact with the septum.

Treatment : A solution of cocaine and adrenalin was applied to the nose, and, so rendering a free passage, a nasal douche was used, and the mucous membrane dried by mopping and with cotton wool. Chromic acid was applied to several areas of the turbinate bodies.

Result : The patient has passed through two seasons without any symptoms of the disease.

Case 2.—Mrs. M., aged 27, resides a few miles from London. In her case the disease first came on about eight years ago ; at that time she resided near Gloucester, and was assisting her father in the hay-fields and got buried under the hay. A few minutes later she was seized with a violent cold in the head and had to be taken home ; her eyes being extremely painful had to be bathed with warm water. She never remembered having hay-fever before, but has suffered every year since. When once the malady sets in she is completely incapacitated from taking any pleasure or attending to the duties of the house.

The attacks of sneezing are so violent and long, that on one occasion her husband counted fifty times, at the end of which she is completely prostrate.

The patient believes that the smell of roses will induce an attack more severe than one following any of the other causes already enumerated.

The patient has a right inguinal hernia which occurred during a bout of sneezing while out driving in the month of June, 1904.

Examination : Hypertrophic rhinitis, spur on either side of the septum.

Treatment : Electro-cautery and removal of spurs. Several hypersensitive areas were cauterized at the same time.

Result : Cure.

Case 3.—Mrs. W., aged 27. Has suffered from hay-fever since she was sixteen years of age. The first time she ever remembered it troubling her was on one occasion when walking through the fields gathering wild flowers in the month of June. She thought at the time she must have taken a violent cold. She had terrible attacks of sneezing, accompanied with a watery discharge from the nostrils, but the eyes were not so much affected as they have been for the last three or four years. She has had the attacks every year since the one mentioned above.

Slight itching of the eyes and nose are amongst the earliest symptoms of the disease, but as it progresses, attacks of sneezing come on, and these become severe and prolonged whenever she ventures out of doors in the country. The eyes itch

intensely and become much inflamed, especially if she rubs them. The patient has always noticed that she is worse during the bright hot sunny days ; at the seaside she is always better, however high the temperature may be.

Examination : The nose perfectly normal as regards the structures. One large hypersensitive area on the septum opposite the middle turbinate.

Treatment : Application of the cautery on four occasions, a week intervening between each sitting, followed with swabbing the nasal mucous membrane with astringent lotions.

Result : Cure.

Case 4.—Miss H., aged 23. Has suffered from hay-fever for years. So far as she can recollect the symptoms commenced about the end of May, and the disease continues until July. During this time she is unable to drive or motor into the country owing to the violent sneezings and a profuse discharge from the nostrils. The attack of sneezing is frequently followed by severe headache, which compels her to remain in a dark room.

Examination : Adenoids, enlarged turbinates with nasal catarrh. The mucous membrane extremely sensitive to any form of touch, which is followed by attacks of sneezing, lachrymation, etc.

Treatment : Removal of adenoids and the application of the electro-cautery.

Result : Cure.

Case 5.—Mr. M., aged 40, a gentleman residing in the County of Berks. At the age of twenty he began to be affected whenever he entered a greenhouse when certain flowers were in bloom. The attack is characterised by the discharge of thin watery serum from the nostrils, by violent attacks of sneezing; swelling of the eyelids and severe lachrymation. When the disease has become fully developed, the fits of sneezing are so severe, that for the time being he loses all control over himself. Occasionally he will sneeze for ten minutes without stopping, and whatever he may be occupied with when the fit comes on he is obliged to set it aside and resign himself to the paroxysm until it is over. A profuse cold sweat will break out at the termination of each of the violent attacks of sneezing. During the course of the disease his nights are often disturbed by fits of coughing and sneezing. There is loss of appetite, mental depression, and by the end of the season, which now extends until the latter end of August, he loses between one and two stone in weight. He also complains of deafness and ringing in the ears, while the stuffiness of the nose lasts.

Examination : The turbinates completely blocked the nostrils when I saw him in the second week in June of last year. The posterior ends were the largest I have ever seen, and appeared to block the posterior

nasal space completely. He states that up to twenty years of age his nose was free of any obstruction.

Treatment : Under an anæsthetic the posterior ends were removed, and the rest of the body freely cauterized. He remained free from the disease after he returned home.

Result : Cure.

Case 6.—A lady, residing in one of the London suburbs, suffered from hay-fever fourteen years. The attacks generally commence about the third week in May; but they come on earlier in a warm season than a cold one. The attacks sometimes cease before the hay is all gathered in; the symptoms are less severe after rain.

Examination : Partial deviation of septum to right side with a fair amount of obstruction.

Treatment : Submucous resection of septum and destruction of the hypersensitive areas on the septum, middle meatus, and the ethmoidal region by the application of chromic acid and astringent lotions.

Result : The patient has passed through two seasons without any signs of the malady.

Case 7.—In this case, a lady, who has suffered from hay-fever since she was 15 years of age.

During the hay-season, smoke affects her sooner than the smell of hay, but at other seasons of the year smoke has no effect.

A trip to the seaside during the hay-season is sure to bring relief if a sea breeze is blowing.

Examination : Hypertrophic rhinitis with nasal catarrh.

Treatment : Posterior ends of the inferior turbinates removed and the application of the electro-cautery with the subsequent use of an alkaline lotion.

Result : Cure.

Case 8.—Dr. S., aged 38. In this case the patient is a medical man in practice in London, who has suffered from hay-fever since he was 14 years of age. The attack usually comes on in June, and lasts from three to five weeks. Since he has resided in London, now three years, the malady is much less severe.

Examination : Septum deviated to right side and almost in contact with the inferior turbinate. The mucous membrane, in the upper and anterior half of the nose, is sensitive to the touch of a probe.

Treatment : The septum was not operated on. The inferior turbinate was freely cauterized.

Result : Free from attacks last summer.

Case 9.—Captain S., an officer in the Royal Army Medical Corps consulted me in September, 1905. In answer to my questions, he says: I was in India for three years, and during the last year suffered from hay-fever, but more severely whilst in parts of the hills, which really correspond with the heat and climate of England, where grain crops were nearly ripe. Long grass was growing in places on the hills. He feels quite certain that if he is in any way worried the attacks are more severe.

Examination : No disease or abnormality present. The nasal mucous membrane is extremely sensitive to mechanical irritation.

Treatment : The application of caustic lotions to the whole of the lining membrane of the nose.

Result : No attacks last season.

Case 10.—Miss F., aged 24. Has suffered from hay-fever four years. The first time she remembers it troubling her was on one occasion when walking through the fields in May, near Ilford. She thought for some time it was a cold of unusual severity, and remained quiet at home taking ordinary remedies, but with no result. She had severe attacks of sneezing, and the running from the nose was so profuse that a dozen handkerchiefs were used. After the disease has lasted a month, her general nervous system is much impaired.

Examination : Nasal cavities normal ; mucous membrane hypersensitive.

Treatment : Electric-cautery and the use of astringent lotions to the nasal mucosa.

Result : No attacks last three summers.

Case 11.—Miss S., aged 28. For four months in the year this patient may be said to be an invalid through hay-fever.

Dust of any kind, whether in or out of doors, will induce the symptoms. Sudden exposure to bright sunlight invariably brings on an attack. Roses affect her so severely that if she handles them a very severe

attack instantly supervenes, worse than from any other flower. Violent paroxysms of sneezing repeat themselves again and again throughout the day

For the last two seasons, that is, from the end of May to the middle of August, she carefully avoids taking exercise during the day time. When I saw her she was anæmic, very low spirited, and complaining of marked disturbances of the digestive functions. Asthma developed for the first time about June, 1904. Both affections persist alternately all through the summer months.

Examination: Turbinates pale and œdematous and absolutely packed up against the septum. The mucous membrane of the tonsils, pharynx and larynx much congested and inflamed. Irritation of the pharynx brings on an attack of asthma.

Treatment: The turbinates were reduced by means of the cautery, and the sensitive areas existing in the nose and pharynx were also destroyed.

Result: Free from hay-fever last season.

Case 12.—A clergyman, residing in Wales, consulted me for hay-fever, he says: "I have suffered for years, but was unaware of the nature of the disease until the summer, 1902 I was staying at the time in Devonshire, and there I met a gentleman suffering from the same malady." The patient does not find the symptoms worse in the country than in the town, unless he walks through or near a

field of ripe grass or hay, and then they become very violent.

He had an uncle who was very sensitive to dust of any kind, and a niece who suffers more than himself, though she lives at the seaside.

Examination : The nose appears perfectly normal, but the mucous membrane presents a bright red appearance and is extremely sensitive to the probe, with areas of sneezing, etc.

Treatment : Chromic acid to sensitive areas.

Result : Cure.

Case 13.—Mr. B., aged 50. Suffers from hay-fever and asthma. The attacks first came on when he was about twenty-one years of age, and in speaking of the disease he says: "I well remember the commencement of those symptom which I now recognise as my annual hay-fever torment. I was at the time in the midst of newly-mown grass, when I was suddenly seized with profuse running from the nose, lachrymation, swelling of the conjunctivæ and eyelids, well-nigh blinding me, and ceaseless sneezing. I remember that I was taken into a farm house by my friends, and speedily recovered. From that time to the present the disease has manifested itself every year, and has always governed my habits and residence during June and July, and part of May and August. The warmer the weather, and the more advanced the vegetation, the earlier does my malady show itself. It usually lasts till

the end of the first week in August (when it leaves me very suddenly), though this also is dependent on the shortness of the haymaking season, for in a hot, dry season (last summer for example), in which the hay is rapidly made and carried, my immunity occurs two or three weeks earlier."

Examination : No pathological or abnormality present, the nasal mucous membrane, as in all these cases, extremely sensitive to any form of irritation. Chronic pharyngitis.

Treatment : Cauterization.

Result : Cure.

Case 14: Mr. L., aged 45. Has suffered from attacks of hay-fever and asthma since he took up motoring five years ago. He says : "The early part of June I was motoring to Brighton ; in front of me were two other motors which had caused a cloud of dust. Suddenly I was seized with intense and violent sneezing, and had to stop the car ; my eyes burnt intensely, and later every joint ached. I was unable to proceed on my journey, and drove to the nearest station and returned to London. The disease persisted more or less for five weeks, and suddenly disappeared." The patient tells me he is unable to do any motoring in the summer, although in the winter it does not affect him. Every severe bout of asthma which he has suffered occurred during the hay-season.

Last year he had, whilst walking in Hyde Park, on

the 15th of May, a good deal of the heat and nose-running accompanying hay-fever, but nothing more until early in June, when, in company with his wife, he started to motor to Eastbourne.

Examination : Hypertrophic rhinitis, with deviation of the septum to the left. Chronic pharyngitis.

Treatment : Galvano-cautery, astringent lotions applied to the hyperæsthetic mucous membrane.

Result : No symptoms since treatment.

Case 15.—Mr. A., aged 39. Has suffered from hay-fever and asthma for nearly twenty years.

The attacks generally begin about the end of May and cease about the middle of July, according as the hay season is early or late. As long as the grass is in flower the hay-fever persists ; afterwards, it ceases. It is not constant throughout this time as one attack but comes and goes with those other symptoms of irritation of the respiratory mucous membrane of which it is a part. The patient says, "the neighbourhood of hay, bright, hot, dusty sunshine, a full meal, &c., suffice at any time to bring on an attack of hay-fever. It is generally worse at night," while the disease lasts the asthma is often so severe as to deprive the sufferer of sleep for nights together, and he leaves his bed in the morning, pallid, and worn out. When the hay season is over the malady vanishes, and for ten months in the year he may calculate on a perfect immunity from even the slightest sensation.

Examination : Partial deviation of septum. Anterior ends of middle turbinates in contact with septum. The nasal and pharyngeal mucous membrane exceedingly sensitive to any form of chemical or mechanical irritation.

Treatment : A 20 per cent. solution of cocaine was applied to the nose and pharynx. The anterior ends of the middle turbinates were removed. Hypersensitive areas cauterized.

Result : The patient has remained free from the attacks since the summer, 1904.

Case 16.—Mrs. H., aged 37, who says: "I have always enjoyed excellent health during the winter and early spring, with the exception of an occasional cold in the head, which, however, was never attended with any difficulty of respiration, or any of the symptoms of asthma. As soon, however, as the warm weather set in, I always began to suffer from colds, and after a short time my breathing would become difficult, and as long as the warm weather continued I suffered severely from hay-fever and asthma; and in spite of all the means recommended to me by my friends to prevent these attacks, or to lessen their severity when once developed, the malady returned regularly every summer."

Examination : The nose quite normal as regards the structures. The whole of the upper and anterior half of the nasal mucous membrane hyperæsthetic.

Treatment : Electro-cautery and the application of astringent lotions.

Result : The patient wrote to me last August stating she was in perfect health, and that she had not suffered from hay-fever during the season.

Case 17.—Mr. S., aged 40. Hay-fever came on after the patient had suffered from ordinary asthma for many years. In commencing to describe the hay-fever symptoms, he says : “ It seems reasonable to suppose that I must have been liable to hay-fever, at the ordinary season, during the whole course of my life, but till within the last few years I was never aware of its presence, or of the existence of such a malady.”

The patient suffers most from paroxysms whilst taking country walks or walking through grass meadows.

Examination : Hypertrophic rhinitis and nasal catarrh. Pharynx congested and granular.

Treatment : Pharynx and inferior turbinates cauterized, and the use of nasal alkaline lotions.

Result : The patient has written to say that he feels cured, having remained free from symptoms for two years.

Case 18.—Mr. A. has suffered from hay-fever as far as he can recollect, since he was fourteen years of age. The attacks usually commence the first week in June and continue for four or five weeks. The first symptom is itching of the nose and throat, followed by

the discharge of thin watery secretion from the nostrils, violent attacks of sneezing, not only in the day, but frequently also during the night.

The patient thinks that dust of any kind, strong light as well as great heat will induce the symptoms.

Examination : The pathological condition present, the nasal mucous membrane sensitive to any form of irritation.

Treatment : The hypersensitive areas cauterized.

Result : Free from the symptoms of hay-fever last year.

Case 19.—Mr. M., aged 40. Has suffered from hay-fever twelve years. The first time he ever remembers it troubling him was on one occasion when out fishing in June. He had terrible attacks of sneezing, discharge from the nostrils, the eyes itched intensely, and became much inflamed and swollen.

The patient states that he is always worse on the bright, hot sunny days if out driving in the country. During the latter years he has attacks of sneezing in the winter when driving facing the horse.

Examination : Hypertrophic rhinitis.

Treatment : Electro-cautery and the applications of astringent lotions.

Result : I treated the patient three years ago ; no symptoms of the disease since.

Case 20.—Mrs. R., aged 46, consulted me in 1904, has suffered from hay-fever for more than twenty-five

years, but the exact time at which the disorder first commenced the patient cannot remember. The attacks at first only lasted a week or ten days and then disappeared.

During the last six years the duration of the attack has increased, beginning in May and terminating the end of September. With regard to the question of the cause the patient is unable to decide, but thinks the grasses affect her most. The seaside has not given her much relief this three years. Rainy weather and also sitting quietly indoors with all the windows closed are both very comforting to the patient when suffering from the malady. When once the hay-fever has developed she is completely prostrate, suffering agonies from stuffiness of the nose, severe attacks of sneezing, and these become prolonged whenever she ventures out. There is at the same time a copious discharge of thin serum from the nostrils, often bloodstained, the eyes itch intensely and become much inflamed, especially if she rubs them, which is impossible to resist doing so. Suffers from severe headache and mental depression. During the summer, 1904, she lost two stone in weight.

Examination : The nasal cavities small and narrow and all the room taken up by the turbinated bodies. The nasal mucous membrane was so sensitive that the mere touch with a probe induced a severe attack lasting the whole day.

Treatment: The inferior turbinates were partly removed with a spoke-shave, of course leaving the bone untouched, followed by subsequent applications of astringent lotions.

Result: The symptoms of hay-fever completely absent during the last two summers.

I may state several of my patients have been treated with pollantin. In none of them did the remedy act, although some thought it gave relief at first.

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